QUALITY-CONTROL SAMPLES 4.3

By F.D. Wilde, T.L. Schertz, and D.B. Radtke

Collection of quality-control (QC) samples is a required component of sample collection for water-quality studies. QC samples are collected, usually at the field site, in order to identify, quantify, and document bias and variability in data resulting from the collection, processing, shipping, and handling of samples by field and laboratory personnel. **The bias and variability associated with data must be known so that environmental data can be adequately interpreted** (Horowitz and others, 1994; Koterba and others, 1994; Koterba and others, 1995).

The procedures for collecting QC samples can depend on, or be modified according to, the purpose of the quality-assurance program. Thus, personnel need to understand the purpose for each QC sample to be collected (Appendix A4-B) and how the resulting QC data will be used. The type, number, and distribution of QC samples are determined by the design and data-quality requirements of the study. For any water-quality sampling schedule, personnel must:

- **Be aware that an equipment blank is required at least annually (NFM 3).**
- **Be alert to field conditions** for which blanks or other QC samples should be collected, in addition to those planned. **It is usually best to collect the additional QC samples;** it can be decided later whether to submit them for laboratory analysis.
- **Collect all field QC samples on the same day that environmental samples are collected,** using the same equipment as for environmental samples.

- **Obtain the QC sample solutions needed.**
  - **Blanks.** The source solution needed for blank samples must be produced and certified by a laboratory to have analyte concentrations that do not exceed a specified method detection limit. Review and keep on file the certificate of analysis for each lot of blank water; keep a record of the lot numbers used for each sample.
    - **Inorganic-grade blank water (IBW)** is required for blanks that will be analyzed for inorganic constituents.
    - **Pesticide-grade blank water** (**PBW**) **and volatile-grade blank water** (**VBW**) are required for blanks that will be analyzed for pesticides and volatile organic compounds, respectively. VBW can also be used for pesticide blanks.
    - **VOC trip blanks** must be requested from the laboratory as a separate order and can be shipped with an order for VOC vials.
  - **Replicates and field-matrix spikes.** The surface or ground water being sampled (environmental water) is the solution used for most types of replicates (sequential, split, and concurrent samples) and spikes.
  - **Standards and reference materials.** Standards and reference materials are either artificial or environmental solutions with known and certified analyte concentrations.
    - Reference materials usually are obtained from the National Institute of Standards and Technology (NIST) (http://www.nist.gov).
    - USGS personnel can obtain Standard Reference Water Samples (SRS) from the USGS Branch of Quality Systems (http://btdqs.usgs.gov).
- **Use preservatives from the same lot number** for the environmental and associated QC samples. Record preservative lot number.

- **Label QC sample bottles** with a QA sample-designation code, site identification number, date of sample collection, and an assigned or real time of collection. Identification of specific types of QC samples can follow a study-developed time-coding protocol in which a specific time interval is assigned that pertains only to a specific type of QC sample.
- **Store QC data in an electronic data base devoted to QC data.** For USGS studies, it is recommended that this be an alternative data base within NWIS QWDATA—check for District and (or) program protocols for QC data-storage requirements.

Use Good Field Practices (table 4-1) and Clean Hands/Dirty Hands techniques (table 4-2) when collecting and processing QC samples.